PRELIMINARY
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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

PT. Merpati Nusantara

PK-MDE

Boeing B737-300

Rendani Airport, Manokwari - Papua Barat
REPUBLIC OF INDONESIA

13 April 2010

NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2010

This Preliminary Factual Report was produced by the National Transportation Safety Committee (NTSC), Karya Building 7th Floor Ministry of Transportation, Jalan Medan Merdeka Barat No. 8 JKT 10110, Indonesia.

The report is based upon the investigation carried out by the NTSC in accordance with Annex 13 to the Convention on International Civil Aviation, Aviation Act (UU No.1/2009), and Government Regulation (PP No. 3/2001).

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GLOSSARY OF ABBREVIATIONS

AD	:	Airworthiness Directive
AFM	:	Airplane Flight Manual
AGL	:	Above Ground Level
ALAR	:	Approach-and-Landing Accident Reduction
AMSL	:	Above Mean Sea Level
AOC	:	Air Operator Certificate
ATC	:	Air Traffic Control
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
ATSB	:	Australian Transport Safety Bureau
Avsec	:	Aviation Security
BMG	:	Badan Meterologi dan Geofisika
BOM	:	Basic Operation Manual
°C	:	Degrees Celsius
CAMP	:	Continuous Airworthiness Maintenance Program
CASO	:	Civil Aviation Safety Officer
CASR	:	Civil Aviation Safety Regulation
CPL	:	Commercial Pilot License
COM	:	Company Operation Manual
CRM	:	Cockpit Recourses Management
CSN	:	Cycles Since New
CVR	:	Cockpit Voice Recorder
DFDAU	:	Digital Flight Data Acquisition Unit
DGCA	:	Directorate General Civil Aviation
DME	:	Distance Measuring Equipment
EEPROM	:	Electrically Erasable Programmable Read Only Memory
EFIS	:	Electronic Flight Instrument System
EGT	:	Exhaust Gas Temperature
EIS	:	Engine Indicating System
FL	:	Flight Level
F/O	:	First officer or Copilot
FDR	:	Flight Data Recorder
FOQA	:	Flight Operation Quality Assurance
GPWS	:	Ground Proximity Warning System
hPa	:	Hectopascals
Hr	:	Hours
ICAO	:	International Civil Aviation Organization
IFR	:	Instrument Flight Rules
IIC	:	Investigator in Charge
ILS	:	Instrument Landing System

Kg	:	Kilogram(s)
Km	:	Kilometer(s)
Kt	:	Knots (nm/hours)
Mm	:	Millimeter(s)
MTOW	:	Maximum Take-off Weight
NM	:	Nautical mile(s)
NTSB	:	National Transportation Safety Board (USA)
KNKT / NTSC	:	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
PIC	:	Pilot in Command
QFE	:	Height above airport elevation (or runway threshold elevation) based on local station pressure
QNH	:	Altitude above mean sea level based on local station pressure
RESA	:	Runway End Safety Area
RPM	:	Revolution Per Minute
ROV	:	Remotely Operated Vehicle
SCT	:	Scattered
S/N	:	Serial Number
SSCVR	:	Solid State Cockpit Voice Recorder
SSFDR	:	Solid State Flight Data Recorder
TS/RA	:	Thunderstorm and rain
TAF	:	Terminal Aerodrome Forecast
TPL	:	Towed Pinger Locator
TSN	:	Time Since New
TT/TD	:	Ambient Temperature/Dew Point
TTIS	:	Total Time in Service
UTC	:	Universal Time Coordinate
VFR	:	Visual Flight Rules
VMC	:	Visual Meteorological Conditions

INTRODUCTION

SYNOPSIS

On 13 April 2010, a Boeing B737-300 aircraft registered PK-MDE was being operated by PT. Merpati Nusantara Airline as a scheduled passenger flight MZ 836, from Hasanuddin Airport, Makassar, Sulawesi to Rendani Airport, Manokwari, Papua. It made a transit stop at Domine Eduard Osok Airport, Sorong, Papua. The pilot in command was the pilot flying, and the copilot, who also held a command rating on the aircraft, was the support/monitoring pilot for the sector to Manokwari.

Due to heavy rain over Manokwari, the departure from Sorong was delayed for about two hours. Approaching Manokawari the crew were informed that the weather was continuous slight rain, visibility 3 kilometers, cloud overcast with cumulus-stratocumulus at 1,400 feet, temperature 24 degrees Celsius, QNH 1012 hectopascals. When the crew reported that they were on final for runway 35 controller informed them that the wind was calm, runway condition was wet and clear. The crew read back the wind condition and that the runway was clear, but did not mention the wet runway condition.

Witnesses stated that the aircraft made a normal touchdown on the runway, about 120 meters from the approach end of runway 35, but the aircraft's engine reverser sound was not heard during landing roll. The aircraft overran the departure end of runway 35, and came to a stop 205 meters beyond the end of the runway in a narrow river; the Rendani River.

Due to the steep terrain 155 meters from the end of runway 35, the airport rescue and fire fighting service had to turn back and use the airport's main road to reach the aircraft, taking about 10 minutes to reach the aircraft. The accident site was in an area of shallow muddy water surrounded by mangrove vegetation. The aircraft was substantially damaged. Nearby residents, police and armed forces personnel assisted the evacuation from the aircraft.

The passengers and crew members were evacuated and moved from the site by 0230. They were taken to the Manokwari General Hospital, and Manokwari Naval Hospital for further medical treatment.

The investigation is continuing and will include analysis of data from the flight data and cockpit voice recorders. Operational documentation and training with respect to aircraft performance, stabilized approach criteria, and operations into wet and contaminated runways will be examined. Runway conditions and safety systems including rescue and fire fighting services, and the system for ensuring flight crews have sufficient and appropriate information to aid their decision making will also be examined. The role of the aviation regulator in providing timely, appropriate and effective oversight of the operator and the aerodrome is being examined.

The National Transportation Safety Committee issued a number of recommendations to PT. Merpati Nusantara and the Directorate General of Civil Aviation with the Preliminary Report, covering adequacy of documentation and training, and regulatory oversight of the airline and the airport.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 13 April 2010, a Boeing B737-300 aircraft registered PK-MDE was being operated by PT. Merpati Nusantara Airline as a scheduled passenger flight MZ 836, from Hasanuddin Airport, Makassar, Sulawesi to Rendani Airport, Manokwari[1], Papua. It made a transit stop at Domine Eduard Osok Airport, Sorong, Papua.

The aircraft departed from Makassar at 2010 UTC[2] and landed at Sorong at 2214 UTC[3]. The scheduled departure time from Sorong was 2235, but due to heavy rain over Manokwari, the departure was delayed for about two hours. The pilot in command was the pilot flying, and the copilot, who also held a command rating on the aircraft, was the support/monitoring pilot. The aircraft subsequently departed Sorong 2 hours and 43 minutes later, at 0118. The observed weather report issued by Badan Meteorologi dan Geofisika (BMG)[4] Manokwari for takeoff and landing at 0100 indicated that the weather was "continuous slight rain, horizontal visibility of 3 to 4 kilometers, cloud overcast cumulus-stratocumulus, westerly wind at 5 knots".

The aircraft's dispatch release from Sorong indicated that the flight was planned under the Instrument Flight Rules (IFR[5]). The destination, Manokwari, had no published instrument approach procedure. Terminal area operations, including approach and landing, were required to be conducted under the Visual Flight Rules (VFR[6]).

At 0146 the crew made the first direct contact with Rendani Radio and reported their position as 14 Nm from Manokwari, and maintaining altitude 10,500 feet. Following this radio contact, Rendani Radio informed the crew that the weather was continuous slight rain, visibility 3 kilometers, cloud overcast with cumulus-stratocumulus at 1,400 feet, temperature 24 degrees Celsius, QNH 1012 hectopascals.

The transcript of the Rendani Radio communications with the aircraft indicated that controller then instructed the crew to descend and joint right downwind for runway 35, and to report when overhead the airport. Shortly after, the crew reported overhead the airport at 5,000 feet. The controller then instructed the crew to report when they were on final approach for runway 35. The crew acknowledged this instruction.

At 0154 the crew reported that they were on final for runway 35. The controller informed them that the wind was calm, runway condition was wet and clear[7].

1 Rendani Airport, Manokwari, Papua will be termed Manokwari throughout this report

2 The 24-hour clock in Coordinated Universal Time (UTC) is used in this report to describe the local time as specific events occurred. Waktu Indonesia Tengah (WITA) is UTC +8 hours. Therefore, 2010 UTC on 12 April 2010 was 0410 local Makassar time on 13 April.

3 Local time in the area of the accident, Eastern Indonesia Standard Time (Waktu Indonesia Timur (WIT)) is UTC +9 hours. Therefore, 2212 UTC on 12 April 2010 was 0812 local Manokwari time on 13 April.

4 BMG is the Indonesia national meteorology office.

5 IFR - Rules applied when flying in cloud or whenever external reference not available

6 VFR - Controlling flight trajectory by reference to identified earth surface

7 Clear – The AFIS terminology to inform the crew that the runway was fit for use.

The crew read back the wind condition and that the runway was clear, but did not mention the wet runway condition.

According to the Rendani Airport Administrator's report to the investigation, the aircraft was observed to make a normal touchdown on the runway at about 0155, about 120 meters from the approach end of runway 35. The report stated that the aircraft's engine reverser sound was not heard during landing roll. Witnesses on board the aircraft also stated that the aircraft made a smooth landing, and the engine reversers were not heard during the landing roll.

During the landing roll, the aircraft veered to the left about 140 meters from the end of runway 35, then overran the departure end of runway 35. At about 0156 it came to a stop 205 meters beyond the end of the runway in a narrow river; the Rendani River.

The Observed Weather Report issued by BMG Manokwari for takeoff and landing at 0200 (4 minutes after the accident) indicated that the weather was continuous moderate rain, with a horizontal visibility of 4 kilometers, cloud overcast cumulus-stratocumulus, south-westerly wind at 5 knots.

The airport rescue and fire fighting unit was immediately deployed to assist the post-crash evacuation. Due to the steep terrain 155 meters from the end of runway 35, the rescuers had to turn back and use the airport's main road to reach the aircraft. The accident site was in an area of shallow muddy water surrounded by mangrove vegetation.

The aircraft was substantially damaged. Nearby residents, police and armed forces personnel assisted the evacuation from the aircraft.

The Rendani Airport Administrator reported that the passengers and crew members were evacuated and moved from the site by 0230. They were taken to the Manokwari General Hospital, and Manokwari Naval Hospital for further medical treatment.

1.2 Injuries to Persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	1	9	10	-
Minor	2	32	34	Not applicable
Nil Injuries	4	62	66	Not applicable
TOTAL	7	103	110	-

All of the passengers and crew were citizens of Indonesia.

1.3 Damage to Aircraft

The aircraft was substantially damaged.

Figure 1: The fractured aircraft fuselage

Figure 2: The left wing tip sheared off from the wing

Figure 3: The right wing and number-two (right) engine damage

Figure 4: The left engine separated

Figure 5: Left wing damage

Figure 6: Passenger cabin damage

1.4 Other Damage

One mango tree situated about 185 meters from the end of runway 35 was clipped by the aircraft's left wing. One langsat tree about 4 meters to the left of the mango tree was also clipped by the left wing tip. There was substantial damage to the mangrove vegetation along aircraft's ground impact trail.

1.5 Personnel Information

1.5.1 Pilot in command

Gender	:	Male
Date of birth	:	26 August 1954
Nationality	:	Indonesia
License	:	ATPL
Date of issue	:	23 May 1985
Valid to	:	20 June 2010
Aircraft type rating	:	B737-300/400/500
Medical certificate	:	Class 1
Date of medical	:	20 December 2009
Valid to	:	20 June 2010
Last proficiency check	:	20 February 2010
Total hours	:	16,450 hours 24 minutes
Last 90 days	:	148 hours 20 minutes
Last 7 days	:	9 hours 57 minutes
Last 24 hours	:	2 hours 18 minutes
This flight	:	42 minutes

1.5.2 Co-pilot

Gender	:	Male
Date of birth	:	17 August 1954
Nationality	:	Indonesia
License	:	ATPL
Date of issue	:	29 May 1985
Valid to	:	28 August 2010
Aircraft type rating	:	B737-300/400/500
Medical certificate	:	Class 1
Date of medical	:	23 February 2010
Valid to	:	22 Juli 2010
Last proficiency check	:	22 March 2010
Total hours	:	22,139 hours 55 minutes
Last 90 days	:	183 hours 29 minutes
Last 7 days	:	21 hours 30 minutes
Last 24 hours	:	2 hours 18 minutes

1.6 Aircraft Information

1.6.1 General

Aircraft manufacturer	:	Boeing Company, Seattle USA
Aircraft model/type	:	B 737-300
Serial number	:	24660
Year of manufacture	:	28 February 1990
Aircraft registration	:	PK-MDE
Certificate of Registration	:	No.2679
Valid to	:	15 November 2010
Certificate of Airworthiness	:	No.2679
Valid to	:	15 November 2010
Time Since New	:	54,759 hours
Cycles Since New	:	38,485 cycles
Maximum Take-off Weight	:	116,600 lbs
Actual Take-off Weight	:	112,300 lbs
Actual Landing Weight	:	108,589 lbs

1.6.2 Engines

Engine type	:	Turbofan
Manufacturer	:	SNECMA
Model	:	CFM56-3C1
Number-one (Left)		
Serial Number	:	724567
Time Since New	:	53,934 hours
Cycles Since New	:	31,353 cycles
Number-two (Right)		
Serial Number #2	:	725718
Time Since New	:	51,027 hours
Cycles Since New	:	34,015 cycles

The Auxiliary Power Unit (APU) had been unserviceable since 12 April 2010.

1.7 Meteorological Information

Weather report for Manokwari (WASR), issued 13 April 2010, at 0100

Surface wind	: Calm
Visibility	: 3000 meters
Present weather	: Continuous slight rain
Cloud	: Overcast cumulus stratocumulus ceiling at 1,400 feet
Temperature	: 24 deg C
Dew Point	: 24 deg C
QNH	: 1012.2 hPa
QFE	: 1011.5 hPa

Weather report for Manokwari (WASR), issued 13 April 2010, at 0200

Surface wind	: South westerly (200 degrees true) 5 knots
Visibility	: 4,000 meters
Present weather	: Continuous moderate rain
Cloud	: Overcast cumulus stratocumulus ceiling 1400 feet
Temperature	: 26 deg C
Dew Point	: 24 deg C
QNH	: 1011.9 hPa
QFE	: 1011.2 hPa

Daylight conditions prevailed at the time of the accident.

1.8 Aids to Navigation

There were no navigation aids for the approach and landing at Manokwari. The an approach and landing must be conducted under the VFR to runway 35 only. The precision approach path indicator (PAPI), installed for runway 35, was not operational at the time of accident.

1.9 Communications

Air traffic communication services provided by the Aerodrome Flight Information Service (AFIS[8]), when operating into Manokwari, were advisory. All communications between Manokwari and the crew were recorded by ground based automatic voice recording equipment. Direct two-way communication between Rendani Radio and the crew was established at 0147, approximately 14 Nm from airport.

1.10 Aerodrome Information

Aerodrome Code	:	WASR / MWK
Airport Name	:	Rendani Airport
Airport Address	:	Jl.Trikora, Rendani PO BOX 164, Manokwari Papua 98315
Airport Class	:	III
Airport Authority	:	DGCA
Airport Service	:	AFIS
Type of Traffic Permitted	:	VFR
Coordinates	:	00° 53′ 37″ S, 134° 03′ 01″ E
Elevation	:	15 feet
Runway Length	:	2,000 meters
Runway Width	:	30 meters
Stopway	:	60 meters

8 Even though the controller gave instructions to the crew, the Aerodrome Flight Information Service at Manokwari provided advisory information.

Runway End Safety Area	:	Nil
Azimuth	:	17 / 35
Category for Rescue Fire Fighting Service[9]	:	Category 3

1.11 Flight Recorders

The aircraft was equipped with a Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR).

Flight Data Recorder (FDR)

Manufacturer	:	Allied Signal
Model	:	980-4700-042
Serial Number	:	5728

Figure 7: Flight data recorder

Cockpit Voice Recorder (CVR)

Manufacturer	:	Allied Signal
Model	:	980-6020-001
Serial Number	:	1751

Figure 8: Cockpit voice recorder

Both recorders were removed from the aircraft and taken to the NTSC laboratory in Jakarta by NTSC investigators. Good quality data from the recorders was downloaded.

9 The Indonesian Aeronautical Information Publication listed Rendani Airport as Category 1 with respect to RFFS. However, the Rendani Airport Administrator reported that Rendani Airport was Category 5. In accordance with ICAO Annex 14 Vol 1 Table 9.1, for Boeing 737-300 aircraft operations, the airport is required to have Category 6 RFFS.

For the purpose of data analysis, and to resolve the unique data frame particular to the accident flight data recorder, the NTSC requested the Australian Transport Safety Bureau (ATSB) and US National Transportation Safety Board (NTSB) to assist.

1.12 Wreckage and Impact Information

The aircraft's final impact position was about 205 meters beyond the departure end of runway 35, bearing 340 degrees magnetic.

The aircraft was substantially damaged. The radome was detached from the aircraft's nose section. The electronic equipment compartment was buried in the mud. The forward fuselage was fractured adjacent to the wing leading edge and bent downward, remaining connected to the rear fuselage via the floor beams. Both wings and adjacent structure, and the nose and main landing gears were substantially damaged. Both engines, including their pylons, were separated from their respective wings.

1.13 Medical and Pathological Information

Medical examinations of the crew and passengers were conducted as a result of this accident.

1.14 Fire

There was no evidence of fire in flight or after the aircraft impact.

1.15 Survival Aspects

The flight crew evacuated the aircraft from the cockpit left side window. A number of passengers left the aircraft through the fracture opening in the fuselage near the wing leading edge. Most of passengers left the aircraft through the right aft service door.

Two passengers were trapped under their seats and had to be assisted by rescuers.

According to witnesses, only two escape slides were used; the front main passenger door escape slide and the right aft service door escape slide. The front main passenger door escape slide did not automatically inflated when the door was opened, but the flight attendant assigned to that door observed the very close proximity with the ground and decided not to manually inflate the escape slide. It was subsequently deployed by the flight crew from outside the aircraft, but was not used for passenger evacuation. The right aft service door escape slide was automatically deployed, but shortly after being used it deflated. The left aft escape slide was not used and the door was kept shut during the evacuation due to the flight attendant observing the strong flowing water along that side of the aircraft.

Witnesses informed the investigation that the airport fire fighting and rescue service personnel arrived about 10 minutes after the accident.

1.16 Tests and Research

Test and research will be considered if additional factual data indicates the requirement.

1.17 Organisational and Management Information

Aircraft Owner	: Wilmington Trust Company Trustee
Address	: Rodney Square North ATTN Corp TRS Wilmington Delaware 19890
Aircraft Operator	: PT. Merpati Nusantara Airlines
Address	: Jl. Angkasa Blok B-15 Kav 2-3
	Kemayoran, Jakarta 10720

The Company Operations Manual found on board the aircraft was not current. The operator also did not have current copies of the Boeing 737-300/CFM56-3B1_20K Flight Crew Operations Manual (FCOM) or Quick Reference Handbook (QRH).

The investigation found a copy of the Boeing 737-400/CFM56-3_22K FCOM and QRH on board the aircraft.

The operator informed the investigation that it had ordered the Boeing 737-300/CFM56-3B1_20K FCOM and QRH from the Boeing Company, which are expected to be delivered during August 2010.

The initial examination of the *Company Operations Manual,* with respect to actual landing distance, found that the policy had not been implemented.[10]

1.18 Additional Information

The investigation is continuing and will include analysis of data from the flight data and cockpit voice recorders. Operational documentation and training with respect to aircraft performance, stabilized approach criteria, and operations into wet and contaminated runways will be examined. Runway conditions and safety systems including rescue and fire fighting services, and the system for ensuring flight crews have sufficient and appropriate information to aid their decision making will also be examined. The role of the aviation regulator in providing timely, appropriate and effective oversight of the operator and the aerodrome is being examined.

1.19 Useful or Effective Investigation Techniques

The investigation is being conducted in accordance with NTSC-approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

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[10] *Company Operations Manual, Operational Directives, Flight Deck Procedures, Paragraph 4.10.6.3, Final Approach and Landing, Actual Landing Distance.*

2 ANALYSIS

To be included in the Final Report.

3 CONCLUSIONS

3.1 Findings

To be included in the Final Report.

3.2 Causes

To be included in the Final Report.

4 SAFETY ACTIONS AND RECOMMENDATIONS

4.1 Safety Actions

At the time of issuing this Preliminary Accident Investigation Report, the National Transportation Safety Committee had not been informed of any safety actions resulting from this accident.

4.2 Recommendations

4.2.1 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General Civil of Aviation (DGCA) should ensure that PT. Merpati Nusantara Airlines Operational Specifications and other technical and operational safety requirements are met. This should include:

a) an extensive review of mandatory operational documentation and associated crew training; and

b) an extensive review of the operational implementation of the *Actual Landing Distance* policy and procedures, and associated training.

4.2.2 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General Civil of Aviation (DGCA) urgently review the Rendani Airport, Manokwari runway complex, to ensure that the runway end safety areas (RESA) meet the dimension Standards prescribed in the International Civil Aviation Organization (ICAO) Annex 14.

Particular attention should be given to:

a) ICAO Annex 14 Paragraph 3.5.2 (Standard) that a runway end safety area (RESA) shall extend from the end of a runway strip to a distance of at least 90 meters.

b) ICAO Annex 14 Paragraph 3.5.3 (Recommendation) that for a Code number 3 airport a runway end safety area (RESA) should, as far as practicable, extend from the end of a runway strip to a distance of at least 240 meters.

If the DGCA is unable to meet the RESA Standard in accordance with ICAO Annex 14, it should file a difference with ICAO as soon as possible.

4.2.3 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General Civil of Aviation (DGCA) urgently review all airports throughout Indonesia involving Civil Aviation Safety Regulation Part 121 and Part 135 aircraft operations, to ensure that the runway end safety areas (RESA) meet the dimension Standards prescribed in the International Civil Aviation Organization (ICAO) Annex 14.

If the DGCA is unable to meet the RESA Standard in accordance with ICAO Annex 14, it should file a difference with ICAO as soon as possible.

4.2.4 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General Civil of Aviation (DGCA) urgently ensure that Indonesian airports equipped with visual approach slope guidance systems, maintain the equipment to a serviceable standard, and are operational particularly during Civil Aviation Safety Regulation Part 121 and Part 135 aircraft operations.

4.2.5 Recommendation to the Directorate General of Civil Aviation (DGCA)

The National Transportation Safety Committee recommends that the Directorate General of Civil Aviation (DGCA) review the procedures and equipment used by airport Rescue and Fire Fighting Services to ensure that they:

a) meet the minimum requirements, including timeliness, specified in the International Civil Aviation Organization's Annex 14; and

b) meet the requirements to cover the area up to 5 NM (8 Km) from the airport perimeter, as stated in the Transport Ministry Decree 47 (KM47).

4.2.6 Recommendation to PT. Merpati Nusantara

The National Transportation Safety Committee recommends that PT. Merpati Nusantara should review its technical and operational safety requirements to ensure they are implemented. This should include:

a) an extensive review of mandatory operational documentation and associated crew training; and

b) an extensive review of the operational implementation of the *Actual Landing Distance* policy and procedures, and associated training.

4.2.7 Recommendation to PT. Merpati Nusantara

The National Transportation Safety Committee recommends that PT. Merpati Nusantara review equipment used by airport Rescue and Fire Fighting Services at airports in its network, to ensure that they meet the minimum requirements for Boeing 737 aircraft, that are specified in the International Civil Aviation Organization's Annex 14.